

ABRI DU PAPE MESOLITHIC INTER-ASSEMBLAGE COMPARISONS

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INTRODUCTION

In this chapter we will compare the contents of the lithic artifact assemblages from Stratum 20 with those from combined Strata 21, 21.1, 22, 22.1 and 22.2 (abbreviated as 21-22). Such a two-way comparison, with the lumping of assemblages from levels below Stratum 20, is done for three basic reasons: 1) the lower group of levels and lenses date to the same radiocarbon age, but are separated in time from Stratum 20 by about 1000 years; 2) the often loose, open-work nature of the scree (*éboulis*) matrix suggests the possibility of inter-level movement of artifacts (and charcoal lumps) within the continuous span of Levels 21-22.2; and 3) the assemblage sizes are so small for the lower suite of levels as to make meaningful comparison impossible without lumping. The purpose of these inter-assemblage comparisons is to ascertain whether there may have been differences in the human use of the Pape rockshelter and in its role or place in the landscape (particularly in terms of lithic procurement, manufacture and use) between the oldest and most recent Mesolithic occupations of the site. The 1000 year difference between Strata 22.2-21 and 20 is, after all, a significant one for the last chapter of the history of hunter-gatherer occupation of Belgium, spanning the period between the early and middle Mesolithic in this region of NW Europe. Stratum 20 dates to 7843 $\pm$ 85 BP, whereas Stratum 22.1 dates to 8756 $\pm$ 83 BP, Stratum 22 to 8780 $\pm$ 85 BP and Stratum 21 to 8817 $\pm$ 85 BP. (All determinations were done by accelerator mass spectrometry on charcoal samples and are uncalibrated.) The three lower dates are statistically indistinguishable at about 8800 years ago. These dates imply the existence of a significant depositional hiatus between Strata 21 and 20. In the L20/21 stratigraphic section, Stratum 20 is about 40 cm thick, whereas the aggregate thickness of Strata 21-22.2 is about 35 cm. However, further downslope (in the O-P/20-21 section, toward the riverbank), Stratum 20 becomes thinner (c.20 cm.) while combined 21-22 becomes thicker (c.75 cm), although no subdivisions or lenses of the latter levels can be discerned there.

In addition to inter-level comparisons, we are interested in trying to see whether lithic assemblage differences exist between the rear and front of the rockshelter. Although our excavation was entirely within the overhang covered area between the vertical rainfall drip line and the base of the cliff, there are essentially two zones: the small inner rockshelter (rows L-I) and the front of the talus surface out to the break-in-slope that descends to the Meuse riverbank (rows M-O). The former area is more sheltered, but spatially very constrained (material from the I and J rows in reality comes from a very narrow crack in the cliff base), whereas the second area (though bounded laterally by scree cones and frontally by the talus slope) was somewhat broader. We hypothesize that there may have been activity and discard differences between the two areas due to their differential space constraints and shelter characteristics. Such differences might exist, especially among the categories of formal tools and larger debris.

INTER-LEVEL COMPARISONS: LITHIC RAW MATERIALS

There is a statistically significant difference ($\text{Chi-sq}=1681.570$, $p=0.001$, $\text{df}=21$) between Strata 20 and 21-22 in terms of the weights of lithic raw material types. Total weight of chipped stone artifacts (debris [=cores+debitage] and tools) for Stratum 20 is 1978 gm and for combined Strata 21-22 is 1808 gm (Table 1). The recent occupation (Stratum 20) is far richer in good-quality (chalk?) flints than the early ones. Combined flint types 10-12 (which intergrade in reality) make up 76% of the Stratum 20 chipped stone weight, but only 39% in Strata 21-22. However, worked limestone is also important by weight in Stratum 20 (17% versus only 0.1% in the early levels). Strata 21-22 are dominated by 904 gm of "other" lithics (50% of the total weight, but only 34 items: 4% by count). The early levels also have 5.25% artifacts of "other flint"---type 19 (9.6% by count).

Despite the skewing produced by the great weight of a few items of miscellaneous, unclassified lithics in Strata 21-22, the Stratum 20 and Strata 21-22 are also statistically different ($\text{Chi-sq}=290.364$, $p=0.001$, $\text{df}=22$) in terms of lithic raw material types for all artifacts by count. Fully 97% of the Stratum 20 lithics are of the good-quality flint types 10-12, and only 80% in Strata 21-22. These flints are likely non-local---probably Upper Cretaceous chalk flints from sources in the region of Spiennes-Mons (Hainaut) and/or on the Hesbaye Plateau (Namur or Liège Province), both in Middle Belgium, at least 70 km and 60 km from Pape to the WNW and N respectively. In contrast, Strata 21-22 have appreciable numbers of an extremely fine grain, light grey flint (type 17---2.5% by count) and "other flints" ("type"19---9.6% by count) (plus 4.2% "other lithics"). All these may be local materials. Specifically, the type 17 flint is thought to be of Secondary age, but redeposited in Tertiary-age materials infilling sinkholes in Carboniferous limestone in the vicinity of the Franco-Belgian border only a few km upstream along the Meuse from Pape (E. Teheux and P. Vermeersch, pers. comm.). It should be noted that the (presumably local) limestone artifacts that represent so much weight in Stratum 20, actually are only 12 in number (albeit large in size). There are 3 limestone artifacts in Strata 21-22, together with a variety of other presumably local, poor-quality lithics ("pseudo" flint, chert, quartzite, quartz, psammite).

In terms of the overall flint versus non-flint contrast, there are statistically significant differences between Strata 20 and 21-22 as measured both by weight ($\text{Chi-sq}=461.568$, $p=0.001$, $\text{df}=1$) and by count ($\text{Chi-sq}=46.565$, $p=0.001$, $\text{df}=1$). The lower levels have twice the number and nearly three times the weight of non-flint (presumably local) artifacts than Stratum 20.

Despite the presence of one tiny item of fine-grain black flint (type 16), possibly from Obourg in the Mons area, the general impression of the early Mesolithic assemblages is one of heavy use of local raw materials. In contrast, the later assemblage is overwhelmingly dominated by flints for which no local source is known, suggesting much more intensive contacts with the fairly distant source areas either via the Meuse-Sambre interfluvium or downriver along the Meuse to its middle course between the cities of Namur and Liège. Conceivably, these data could be indicative in differences between the 9000 BP and 8000 BP occupations of Pape in terms of the territories, mobility patterns and/or social contacts of the respective inhabitants of this little rockshelter on the banks of the upper Belgian Meuse

canyon. It is perhaps noteworthy that Wommersom quartzitic sandstone (well known in many other Belgian Mesolithic contexts [Caspar 1984]) is absent from the Pape assemblages. Wommersom (the only known, highly localized source) is 65 km north of Pape in eastern Brabant. Since Wommersom is not far from Orp, which is one of the closest known sources of Hesbaye Maastrichtian chalk flint, this might be an indication that the occupants of Pape obtained their chalk flint from the Mons-Spiennes-Obourg area to the west---not from Hesbaye. On the other hand, both Strata 20 and 21-22 yielded trace quantities (1 and 2 items respectively) of sandstone possibly of a type that is known to outcrop in the Brussels Basin of central Brabant.

Of the 30 blanks (flakes, blades, bladelets, etc.) used to make tools in Stratum 20, all are flint and 90% are of types 10-12 flint (non-local chalk varieties)(Table 2). The 16 tools from Strata 21-22 include one psammite (scraper/knife) and one "pseudo" flint item each, although the rest are type 10 flint (n=13) and type 12 flint (n=1). However, in terms of counts, the assemblages are not statistically significantly different in terms of raw materials used to make tools ($\text{Chi-sq}=6.671$, $p=0.352$, $\text{df}=6$). In both horizons, it seems that people strongly preferred non-local, good-quality flint for the few retouched tools and weapons that they had (perhaps brought with them from the flint source area[s] when they came to Pape?), even when local stones were knapped expediently for flakes, etc., especially during the early occupations. There is a statistically significant difference ($\text{Chi-sq}=49.193$, $p=0.001$, $\text{df}=6$) in terms of the lithic raw material weights for tools between the two horizons. This reflects on the relatively great weight of "pseudo" flint, psammite and type 10 flint in Strata 21-22 and of types 11 and 13 flint in Stratum 20. Given the very small sample sizes, however, little importance should be attached to this observation.

LITHIC DEBRIS

Due to small sample sizes, our 31-unit typology of lithic debris/blank types has been collapsed into five or six categories for these comparisons. The first comparison includes fire-cracked rocks and river cobbles (both of which, strictly speaking, are "manuports", although some of the pebbles could have washed and fallen down the cliff from ancient terrace deposits on the plateau above). The other classes are: all microdebitage (trimming flakes and shatter, <1 cm in maximum dimension), other flakes, blades, bladelets (< 2 cm in length), and cores+chunks (core remnants/large angular debris). Both comparisons (with and without manuports) show statistically significant differences between the Stratum 20 and 21-22 assemblages ($\text{Chi-sq}=238.191$, $p=0.001$, $\text{df}=5$ and $\text{Chi-sq}=72.407$, $p=0.001$, $\text{df}=4$, respectively). Uncollapsed, the lithic debris assemblages were also compared between the two strata, resulting again in a statistically significant difference ($\text{Chi-sq}=303.477$, $p=0.001$, $\text{df}=24$).

Of all the Stratum 21-22 debris, 16.5% are fire-cracked rocks and cobbles (mostly the former), versus only 3% in Stratum 20. There may have been a great deal more fire-roasting activity in the early Mesolithic occupations than during the later ones (fire-cracked rock n=109 for Strata 21-22 vs. 38 for thicker Stratum 20).

Leaving aside the manuports, the principal differences between the debris assemblages of the upper and lower Mesolithic horizons (Tables 3,4,5) lie in the relative frequencies of unretouched flakes (only 17% in Stratum 20 vs. 30% in Strata 21-22) and bladelets (35% in Stratum 20 vs. only 24% in Strata 21-22). This difference is probably an important indicator of technological differences between the two sets of occupations. Although both horizons have about the same percentage of blades (10% in Stratum 20 vs. 11% in Strata 21-22), there is a clear focus on bladelets ($n=671$) in the more recent assemblage. Oddly, however, only 37% of the retouched tools in Stratum 20 are made on bladelets and small blades versus 69% of the small tool assemblage in Strata 21-22. Microdebitage is slightly more abundant in Stratum 20 (36%) than in Strata 21-22 (31%), but both horizons have 4 cores and several chunks. In terms of relative frequencies of cortical versus non-cortical debris, there is a statistically significant difference ($\text{Chi-sq}=21.485$, $p=0.001$, $\text{df}=2$) between the horizons, with more cortical material in Strata 21-22. This makes sense in light of the apparent relative emphasis on *local* lithic raw materials in the early occupations. The non-local flints, so abundant in the late occupations, may have arrived more often at Pape in wholly or substantially decorticated form for reasons of transport cost. It is noteworthy that, while both horizons have the same number of cores (and these are very small in size), Stratum 20 has twice as many cortical chunks (in part core remnants) as non-cortical ones. In Strata 21-22, cortical chunks actually slightly outnumber non-cortical ones.

Figures 1 and 2 present the distributions of lengths of whole blades and bladelets from Strata 21-22 and 20 respectively (see also Photo 2). In both cases, most unbroken laminar products fall in the range of 11-30 cm in length, but there is a slight tendency for *bladelets* (<2 cm) to dominate the later assemblage (mode=11-20 mm; presence of a bladelet <11 mm long; smaller percentages of items >30 mm than in Strata 21-22 despite the presence of a couple of items measuring 51-60 mm long). The distribution of lengths for Strata 21-22 is skewed toward the higher values. Yet, in all events, the laminar products are mostly very short.

The mode of widths of whole blades and bladelets is the same (6-10 mm) for both assemblages (Figures 3 and 4), but, while Stratum 20 has *relatively* fewer broader items, Strata 21-22 have a substantial percentage that measure 11-15 mm wide. In addition, Stratum 20 has a respectable number of very narrow bladelets (1.5 mm), while Strata 21-22 have very few. Despite having the same modal value, the two laminar assemblages differ in that Stratum 20 seems to have a greater spread of widths and Strata 21-22 have tighter standardization between 6-15 mm.

TOOLS

There is not a statistically significant difference between the upper and lower Mesolithic horizons in terms of the distribution of blank types used to make tools ($\text{Chi-square}=11.890$, $p=0.292$, $\text{df}=10$), despite the relative prominence of blades and bladelets among the few tools in Strata 21-22 (Table 6). However, in terms of tool groups (endscrapers, burins, perforators, retouched and backed blades and bladelets, armatures and others) (Table 7), there is a statistical difference ($\text{Chi-sq}=12.717$, $p=0.026$, $\text{df}=5$). Endscrapers are abundant

(23%) in Stratum 20 but absent in Strata 21-22, whereas the reverse is true for armatures (19% in Strata 21-22, but absent in Stratum 20). Retouched blades/bladelets are *relatively* more abundant in Strata 21-22, but the absolute quantities are nearly the same.

It should be noted that the only (albeit very few---at most 3) "armatures" occur in the lower horizon: 2 triangles in Stratum 22 and a possible Tardenois point in Stratum 22.1 (Table 8). Almost the only truncated elements are also from the lower horizon (Figure 5, Photo 1). On the other hand, it is Stratum 20, the most recent Mesolithic horizon (Figure 6), that yielded the only endscrapers (7), an atypical perforator/ bec and a simple burin on break: types characteristic of the Upper Paleolithic. Both upper and lower horizons, however, contain a few sidescrapers, notches and denticulates. There is no statistically significant difference between the two horizons in terms of tool length ($\text{Chi-sq}=4.252$, $p=0.514$, $\text{df}=5$) and all are very small. A third (33%) of the Stratum 20 tools are 2 cm long or less and 62.5% of the Strata 21-22 tools/weapons fall into that category. Another 23.3% of the Stratum 20 tools fall between 21-25 mm in length. In both assemblages, only 6-7% of the tools are longer than 4 cm. These are truly microlithic industries. Consequently, various kinds of hafts (presumably mainly of wood) would have been critical elements of the technologies. The only osseous tools are 2 tips of antler tine punches in Stratum 20 and another virtually identical one in Stratum 22, plus a grooved, burned bone fragment in Stratum 20.

INTER-AREA COMPARISONS

In Strata 21-22, there was still significant "head-room" at the rear of the inner rockshelter. In this, the lower Mesolithic horizon, 63% of the lithic debris by count were found in the back squares (rows L-I) and only 37% in the front squares (rows M-O) of the excavation trench (Table 9). The difference between the two areas is statistically significant ($\text{Chi-sq}=10.213$, $p=0.037$, $\text{df}=4$). By weight, 70% of the Stratum 21-22 debris is in the rear versus only 30% in the front ($\text{Chi-sq}=32.436$, $p=0.001$, $\text{df}=4$). The situation is exactly reversed in the upper horizon, by which time it would have been harder (and in the rear-most squares, impossible) to use the back of the inner rockshelter. In Stratum 20, over 73% of the debris items are now in the front of the site versus slightly under 27% in the back area ($\text{Chi-sq}=24.942$, $p=0.001$, $\text{df}=4$). In terms of debris weight, 71.5% is in the front and 28.5% is in the rear ($\text{Chi-sq}=58.500$, $p=0.001$, $\text{df}=4$). In Strata 21-22 all groups of lithic debris are much more abundant in the back area than in the front---except blades, which are virtually equal in both areas (44 vs. 41, respectively). Exactly the reverse is the case in Stratum 20: all categories of debris are more abundant in the front than in the rear---except cores/chunks, which are equal (23 vs. 22, respectively). As an hypothesis, we suggest that possibly the exhausted cores were tossed from the place of their more likely working on the front of the talus surface toward the back of the shelter to dispose of them. All other classes of debitage are 2-4 times more abundant in the front area than in the back of the shelter.

Analysis of the admittedly much smaller samples of retouched tools shows a similar shift toward the front of the rockshelter between early and later Mesolithic occupations (Table 10). In Strata 21-22, 8 of the tools are in the front and 8 in the rear, whereas in Stratum 20, 23

are in the front and 7 are in the rear. This difference is not highly significant ($\text{Chi-sq}=3.377$, $p=0.066$, $\text{df}=1$). However, in terms of tool *weights*, the difference is significant ($\text{Chi-sq}=33.619$, $p=0.001$, $\text{df}=1$). In Strata 21-22, 76.5% of the weight is in the back versus 23.5% in the front of the shelter. In contrast, in Stratum 20, 69% of the total tool weight is in the front versus 31% in the back. Of note are the facts that all three of the armatures (all in Strata 21-22) are from the front area and that all but one of the endscrapers (all in Stratum 20) are also from the front rows. These results are probably merely a reflection of the changes undergone by the Pape shelter as a result of progressive sedimentary in-filling, with consequent loss of useable space at the cliff base and expansion of the talus deposit toward the riverbank. There are no apparent manmade features, such as constructed hearths, that we can use to "center" activity areas. Such activities were probably just situated *ad hoc* relative to physical features of the rockshelter at the different times of human visits: position of the dripline, cliff base, talus break-in-slope, lateral scree cones and inter-cone "hollow".

SUMMARY AND CONCLUSIONS

Little can be said in terms of potential activity areas in the small excavated zone of this small site. There are no structural indicators (constructed hearths, pits, pavements, or other evidence of infrastructure investment) to anchor such an analysis. The occupations seem to have been ephemeral and *ad hoc*, with no apparent modifications of the living space and no concrete specialized task organization in space beyond taking advantage of the natural features of the rockshelter as they were encountered upon each visit. The talus slope, the hollow between lateral scree cones at the top of the talus, the dripline (progressively receding with time) and the inner, most sheltered part of the cavity at the exposed cliff base (progressively advancing through time as it filled up with scree) were the natural structuring elements that were exploited by each (brief) successive human occupation. Hence, as the inner shelter filled up and the talus moved progressively toward the river bank, most human activities would also naturally "migrate" in that direction. Loss of the innermost shelter occurred by natural infilling during the 1000 year interval between the early and later Mesolithic horizons; hence the difference between the mainly inward distribution of objects during the closely spaced "occupations" of Strata 22.2, 22.1, 22, 21.1 and 21 and the mainly outward one of the Stratum 20 "occupation(s)". At least in the excavation zone, the lower levels were far richer in fire-cracked rock than Stratum 20, but the absolute numbers and weights are small in reality and no distinct hearths or roasting pits survived. Fires may simply have been built on the ground surface and ringed with rocks that were later displaced and strewn about by subsequent human activity and/or natural erosive processes.

On the other hand, there are distinct differences in time between the early and later Mesolithic stone artifact assemblages that may be informative of changes in human behavior. The early occupations made significant use of a variety of local (and usually inferior-quality) lithic raw material, although excellent-quality, non-local chalk flint debris, and especially tools, are present. They favored this "exotic" material, but perhaps had difficult access to it and used what they had to the maximum. (The average tool weight on non-local, chalk flints in Strata 21-22 is 2.9 gm versus 5.3 gm in Stratum 20, while average debris weight for these

flints is 1.1 gm for Strata 21-22 and 0.8 gm for Stratum 20). In Stratum 20, 1000 years later, there is a dramatic increase in the chalk flints, suggesting easier or more frequent access to the sources (probably in the Mons-Spiennes region to the west). This could be indicative of some change or expansion of the territory or range of the human group that made use of the Upper Belgian Meuse/Lesse confluence area. This territory may not, however, have included the area of Middle Belgium that has the point source of Wommersom quartzitic sandstone, so frequent in later Mesolithic assemblages of northern and central Belgium. The chalk flint arrived at Pape in essentially decorticated form and the cores were probably very small. To be sure, all the flint cores and core remnants that were finally discarded at the site are diminutive and clearly exhausted.

In terms of retouched tools and weapons, the only weapon tips/barbs ($n=3$) are in the early horizon. This poverty of armatures is apparently typical of the Ardennian Mesolithic (Rozoy 1990). Backed blades/bladelets are totally absent in both horizons, but unretouched bladelets are far more common in the recent horizon than in the early one, perhaps as a product of the greater use of good flint in Stratum 20 as opposed to the use of a variety of poorer materials (consequently [?] with many relatively more flakes) in Strata 21-22. The concentration of endscrapers and retouched blades/bladelets in Stratum 20, in contrast, could be indicative of a certain degree of functional specialization at Pape---possibly related to hide processing. There is a complete absence of grinding stones, mortars, etc. And, despite the good preservation of bone (including three antler tine punches), the riverside location and the presence of many fish remains at this site, there are no bone fish gorges (or other bone points).

Thus, while there are some similarities between the ca. 9000 BP and ca. 8000 BP occupations of this little rockshelter bivouac, there do seem to have been subtle differences in terms of the nature of the activities that were conducted *in situ* and in the "world" (or at least, "catchment" territory) to which Pape's Early and Middle Mesolithic "visitors" belonged.

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Table 1. Frequencies and weights of lithic raw material types for all lithic items by dated Mesolithic occupation levels from l'Abri du Pape.

	Stratum 20				Strata 21 + 22			
	Frequency		Weight (g)		Frequency		Weight (g)	
Raw material type	n	%	n	%	n	%	n	%
10: fine-grain blue-gray flint	1368	69.69	1048	52.98	437	54.42	480	26.55
11: fine-grain brown-yellow flint	269	13.70	227	11.48	117	14.57	140	7.74
12: medium-grain flint	268	13.65	227	11.48	91	11.33	89	4.92
13: fine-grain dark brown flint	3	0.15	41	2.07	4	0.50	6	0.33
14: "pseudo" flint	10	0.51	60	3.03	5	0.62	9	0.50
15: black flint	1	0.05	1	0.05	3	0.37	2	0.11
16: fine-grain black flint					1	0.12	1	0.06
17: very fine-grain light gray flint	1	0.05	1	0.05	20	2.49	65	3.60
19: other flint	19	0.97	26	1.31	77	9.59	95	5.25
20: chert	1	0.05	2	0.10	4	0.50	5	0.28
40: medium-grain limestone	6	0.31	326	16.48	3	0.37	2	0.11
41: fine-grain limestone	6	0.31	4	0.20				
50: medium-grain quartzite	1	0.05	1	0.05	2	0.25	2	0.11
51: fine-grain quartzite/siltstone	1	0.05	1	0.05				
52: quartz crystal	2	0.10	4	0.20	1	0.12	1	0.06
54: Brussels sandstone	1	0.05	1	0.05	2	0.25	2	0.11
55: psammite					1	0.12	4	0.22
90: ochre/hematite					1	0.12	1	0.06
99: other	6	0.31	8	0.40	34	4.23	904	50.00
TOTAL:	1963	100.0	1978	100.0	803	100.0	1808	100.0

Table 2. Frequencies and weights of lithic raw material types for tools only by dated Mesolithic occupation levels from l'Abri du Pape.

	Stratum 20				Strata 21 + 22			
	Frequency		Weight (g)		Frequency		Weight (g)	
Raw material type	n	%	n	%	n	%	n	%
10: fine-grain blue-gray flint	22	70.97	124	64.25	13	81.25	37	78.72
11: fine-grain brown-yellow flint	3	9.68	20	10.36				
12: medium-grain flint	3	9.68	5	2.59	1	6.25	1	2.13
13: fine-grain dark brown flint	2	6.45	40	20.73				
14: "pseudo" flint					1	6.25	5	10.64
19: other flint	1	3.23	4	2.07				
55: psammite					1	6.25	4	8.51
TOTAL:	31	100.0	193	100.0	16	100.0	43	100.0

Table 3. Frequencies and percentages of unretouched lithic debris types by dated Mesolithic occupation levels from l'Abri du Pape.

Debris type	Stratum 20		Strata 21+22	
	n	%	n	%
1: non-cortical trimming flake	467	24.23	134	17.77
22: cortical trimming flake	8	0.42	4	0.53
2: non-cortical shatter	212	11.00	74	9.81
23: cortical shatter	9	0.47	20	2.65
3: plain flake	260	1.49	168	22.28
4: primary decortication flake	15	0.78	10	1.33
5: secondary decortication flake	52	2.70	44	5.84
6: plain whole/proximal blade	84	4.36	41	5.44
24: broken plain blade	52	2.70	33	4.38
7: primary whole/proximal decortication blade	5	0.26	2	0.27
8: secondary whole/proximal decortication blade	32	1.66	8	1.06
27: medial/distal cortical blade	10	0.52		
9: plain whole/proximal bladelet	481	24.96	98	13.00
25: broken plain bladelet	174	9.03	78	10.34
28: medial/distal cortical bladelet	5	0.26	3	0.40
29: whole/proximal cortical bladelet	11	0.57	3	0.40
11: unidirectional crested blade			1	0.13
20: platform renewal flake	5	0.26	4	0.53
14: prismatic blade core	1	0.05		
17: pyramidal bladelet core	2	0.10	2	0.27
18: mixed core	1	0.05	2	0.27
19: non-cortical chunk	28	1.45	12	1.59
26: cortical chunk	13	0.67	13	1.72
TOTAL:	1927	100.0	754	100.0

Table 4. Comparison of combined debris types (excluding tools) between occupation levels from l'Abri du Pape.

Debris group	Stratum 20		Strata 21+22	
	n	%	n	%
microdebitage	696	35.05	232	25.69
flakes	332	16.72	226	25.03
blades	183	9.21	85	9.41
bladelets	671	33.79	182	20.16
cores/chunks	45	2.27	29	3.21
TOTAL:	1927	97.03	754	83.50

Table 5. Frequencies and percentages of all lithic debris types (including tool blanks) by dated Mesolithic occupation levels from l'Abri du Pape.

Debris type	Stratum 20		Strata 21+22	
	n	%	n	%
1: non-cortical trimming flake	467	23.85	134	17.40
22: cortical trimming flake	8	0.41	4	0.52
2: non-cortical shatter	212	10.83	75	9.74
23: cortical shatter	9	0.46	20	2.60
3: plain flake	272	13.89	170	22.08
4: primary decortication flake	16	0.82	10	1.30
5: secondary decortication flake	57	2.91	46	5.97
6: plain whole/proximal blade	87	4.44	43	5.58
24: broken plain blade	57	2.91	40	5.19
7: primary whole/proximal decortication blade	5	0.26	2	0.26
8: secondary whole/proximal decortication blade	33	1.69	9	1.17
27: medial/distal cortical blade	10	0.51		
9: plain whole/proximal bladelet	481	24.57	98	12.73
25: broken plain bladelet	174	8.89	78	10.13
28: medial/distal cortical bladelet	5	0.26	4	0.52
29: whole/proximal cortical bladelet	13	0.66	3	0.39
11: unidirectional crested blade			1	0.13
20: platform renewal flake	6	0.31	4	0.52
14: prismatic blade core	1	0.05		
17: pyramidal bladelet core	2	0.10	2	0.26
18: mixed core	2	0.10	2	0.26
19: non-cortical chunk	28	1.43	12	1.56
26: cortical chunk	13	0.66	13	1.69
TOTAL:	1958	100.0	770	100.0

Table 6. Frequencies and percentages of lithic debris blank types for tools by dated Mesolithic occupation levels from l'Abri du Pape.

Debris type	Stratum 20		Strata 21+22	
	n	%	n	%
2: non-cortical shatter			1	6.25
3: plain flake	11	35.48	2	12.50
4: primary decortication flake	1	3.23		
5: secondary decortication flake	6	19.35	2	12.50
6: plain whole/proximal blade	3	9.68	2	12.50
24: broken plain blade	5	16.13	7	43.75
8: secondary whole/proximal decortication blade	1	3.23	1	6.25
28: medial/distal cortical bladelet			1	6.25
29: whole/proximal cortical bladelet	2	6.45		
20: platform renewal flake	1	3.23		
18: mixed core	1	3.23		
TOTAL:	31	100.0	16	100.0

Table 7. Comparison of combined tool types between occupation levels from l'Abri du Pape.

Tool groups	Stratum 20		Strata 21+22	
	n	%	n	%
endscrapers	7	22.58		
perçoirs/burins	2	6.45		
retouched blades	9	29.03	9	56.25
retouched bladelets	4	12.90	1	6.25
armatures			3	18.75
other	9	29.03	3	18.75
TOTAL:	31	100.0	16	100.0

Table 8. Frequencies and percentages of formal tool types (de Sonneville-Bordes and Perrot typology) by dated Mesolithic occupation levels from l'Abri du Pape.

Tool types	Stratum 20		Strata 21+22	
	n	%	n	%
1: simple endscraper	1	3.23		
2: atypical endscraper	1	3.23		
8: endscraper on flake	1	3.23		
12: atypical carinated endscraper	2	6.45		
13: thick nosed endscraper	1	3.23		
15: core endscraper	1	3.23		
24: bec	1	3.23		
30: angle on break burin	1	3.23		
60: straight truncated piece			1	6.25
61: oblique truncated piece			1	6.25
62: concave truncated piece	1	3.23		
65: piece with continuous retouch - one edge	5	16.13	6	37.50
66: piece with continuous retouch - two edges	3	9.68	1	6.25
74: notch	6	19.35	1	6.25
75: denticulate	2	6.45	1	6.25
77: sidescraper	1	3.23	1	6.25
79: triangle			2	12.50
89: notched bladelet	4	12.90	1	6.25
92: other (Tardenois point)			1	6.25
TOTAL:	31	100.0	16	100.0

Table 9. Spatial comparison of combined debris groups by occupation level at l'Abri du Pape.

	Stratum 20								Strata 21+22							
	Front				Back				Front				Back			
debris group	n	%	wt	%	n	%	wt	%	n	%	wt	%	n	%	wt	%
microdebitage	496	35.15	141	13.43	200	38.76	62	14.76	91	32.73	48	18.46	141	29.62	98	16.50
flakes	264	18.71	387	36.86	68	13.18	101	24.05	74	26.62	79	30.38	152	31.93	214	36.03
blades	122	8.65	187	17.81	61	11.82	97	23.10	41	14.75	58	22.31	44	9.24	73	12.29
bladelets	506	35.86	256	24.38	165	31.98	81	19.29	66	23.74	55	21.15	116	24.37	94	15.82
cores/chunks	23	1.63	79	7.52	22	4.26	79	18.81	6	2.16	20	7.69	23	4.83	115	19.36
TOTAL:	1411	100	1050	100	516	100	420	100	278	100	260	100	476	100	594	100

Table 10. Spatial comparison of combined tool types by occupations level at l'Abri du Pape.

	Stratum 20								Strata 21+22 ²							
	Front				Back				Front				Back			
tool group	n	%	wt	%	n	%	wt	%	n	%	wt	%	n	%	wt	%
endscrapers	6	26.09	51	40.16	1	12.50	4	6.06								
perçoirs/beccs					2	25.00	12	18.18								
blades	6	26.09	16	12.60	3	37.50	5	7.58	4	50.00	8	66.67	5	62.50	20	51.28
bladelets	4	17.39	4	3.15					1	12.50	1	8.33				
armatures									3	37.50	3	25.00				
other	7	30.43	56	44.09	2	25.00	45	68.18					3	37.50	19	48.72
TOTAL:	23	100	127	100	8	100	66	100	8	100	12	100	8	100	39	100

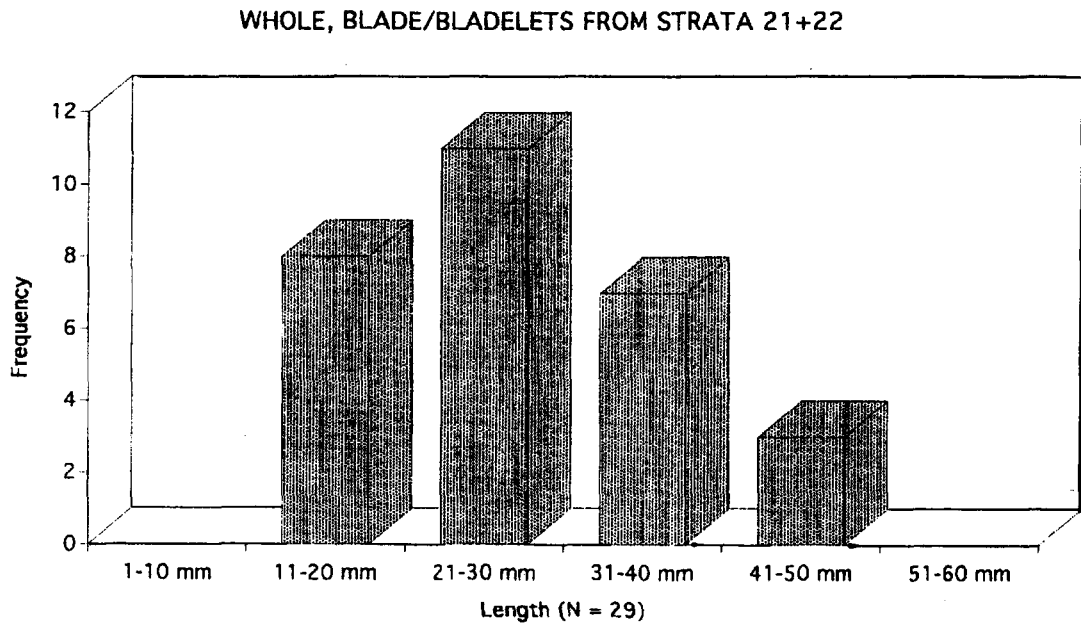


Figure 1.

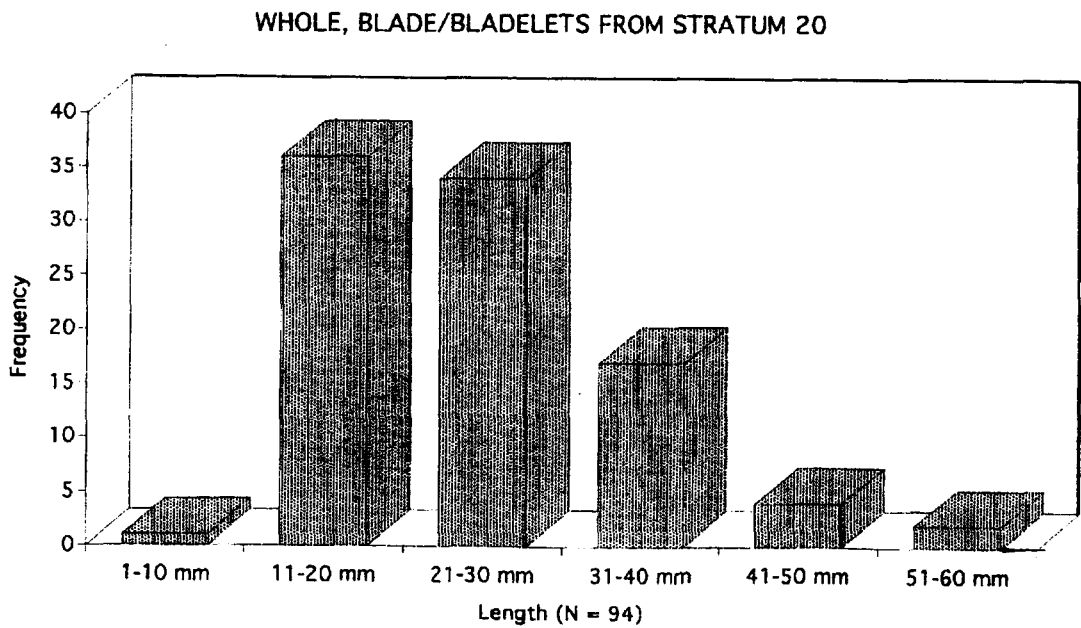


Figure 2.

WHOLE, BLADE/BLADELETS FROM STRATA 21+22

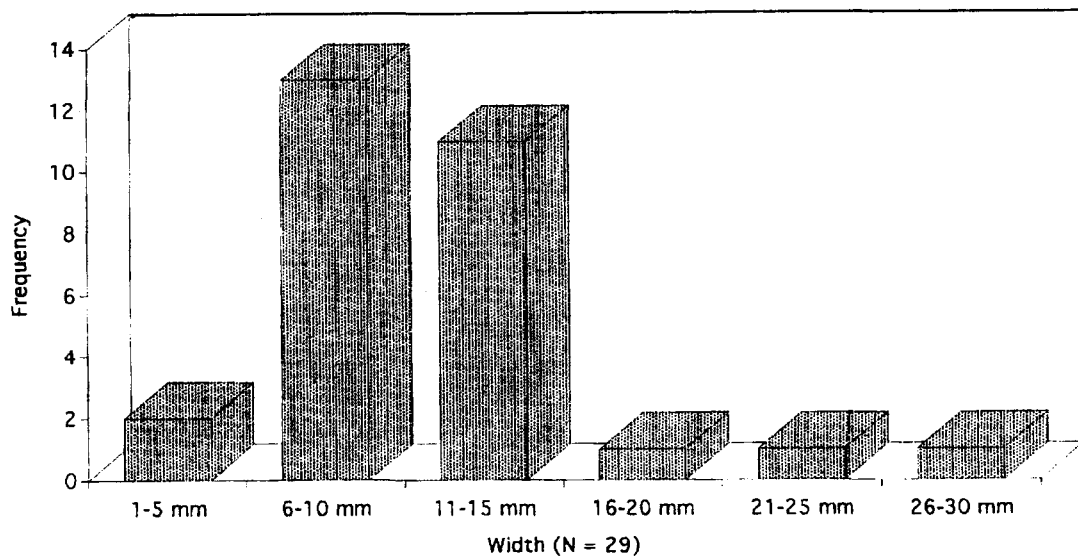


Figure 3.

WHOLE, BLADE/BLADELETS FROM STRATUM 20

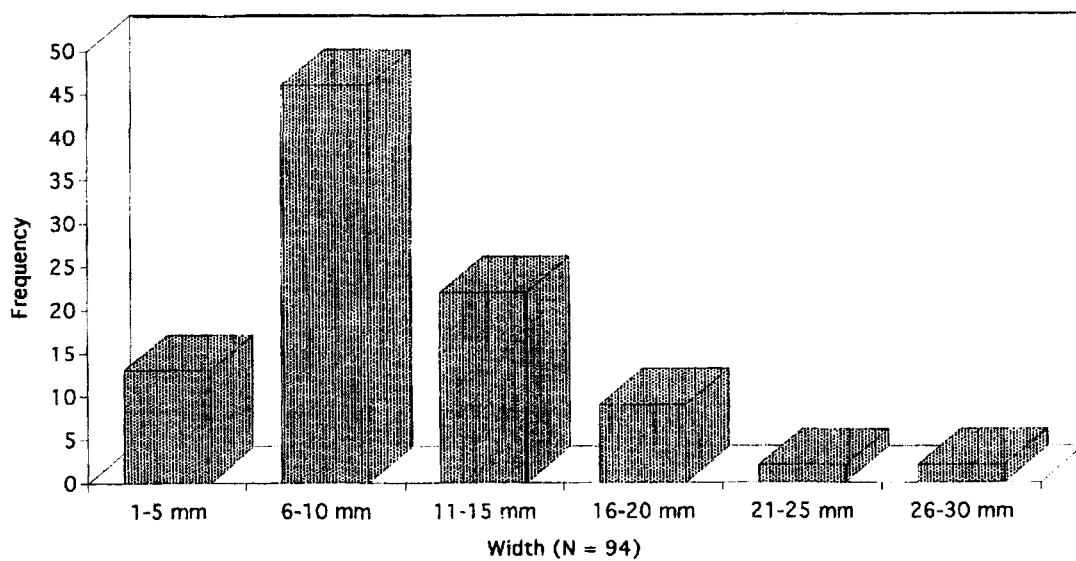


Figure 4.

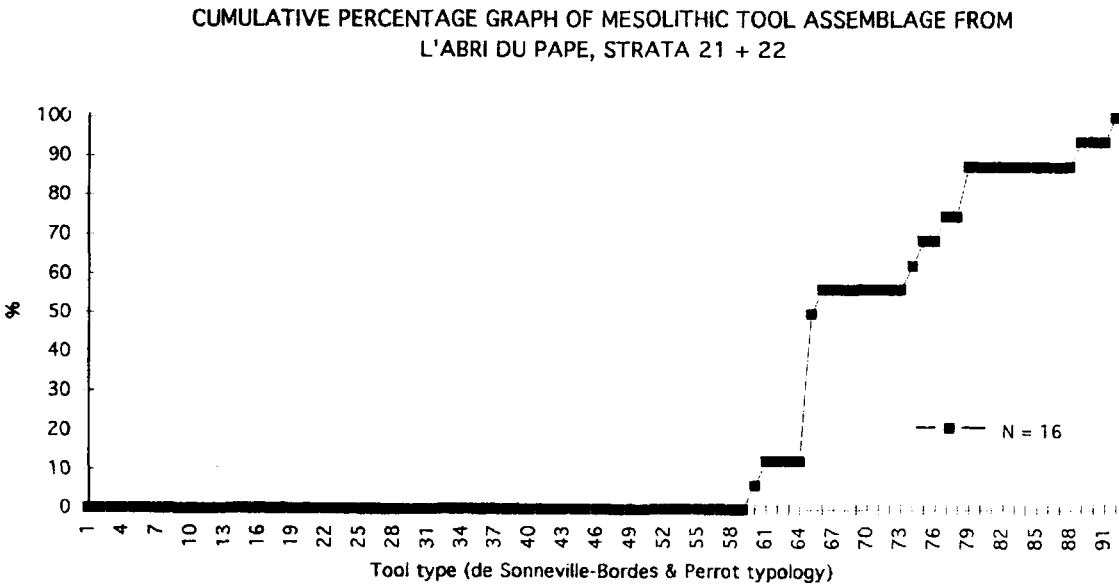


Figure 5.

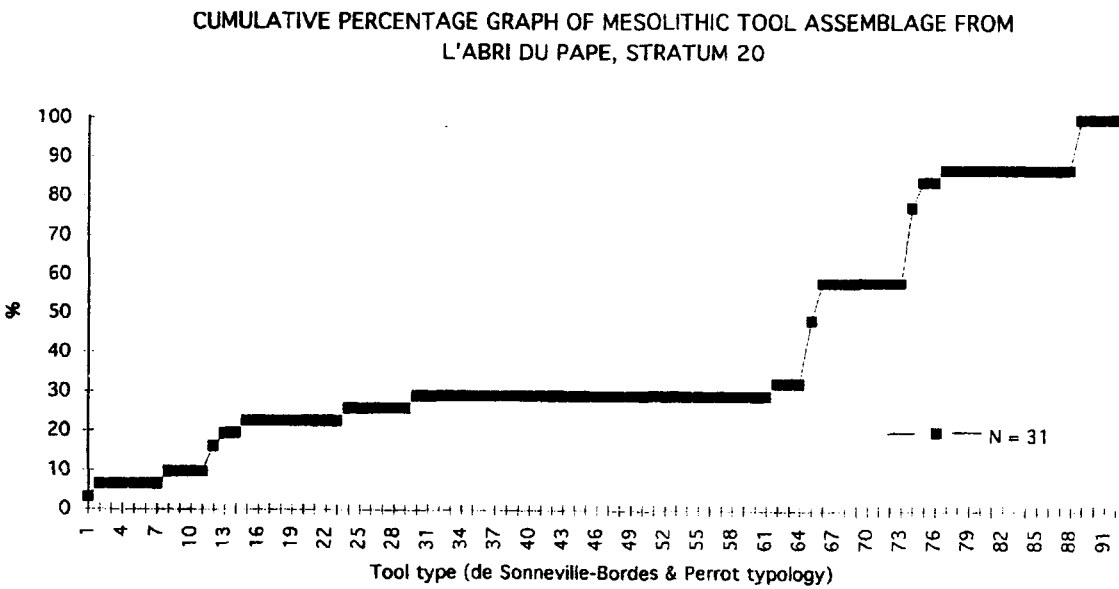


Figure 6.



Photo 1. Abri du Pape. Stratum 22. Retouched quartzite blade, Tardenois point, triangle and triangle fragment. (Photo: L.G. Straus)



Photo 2. Abri du Pape. Stratum 22.2. Flint blade and bladelet core. (Photo: L.G. Straus)